

REMARKS/ARGUMENTS

Claims 1–5 and 21-30 are pending in the application.

Claims 1-5 and 21-30 were rejected under 35 U.S.C. 102(b) as being anticipated by Yoshimura (US 5,512,328). Claims 1-5 and 21-30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Endo (US 4,532,150) in view of Weidman (US 4,921,321) and Ogawa (US 5,500,250).

Rejection of claims 1–5 and 21-30 as being anticipated by Yoshimura

Yoshimura forms a film layer on a substrate and then patterns the film layer to create discrete regions of film layer and exposed substrate. Either the regions of film layer or exposed substrate are further treated to form regions differing in hydrophilicity. That is, one of the resulting regions of the film layer or exposed substrate is exclusively hydrophilic, while the other is exclusively hydrophobic. Yoshimura teaches vapor deposition of a hexamethyl disilazane film (hydrophobic material) on a hydrophilic substrate material. Alternatively Yoshimura uses electron beam energy to selectively form a carbon film (hydrophobic) layer on a silicon substrate (hydrophilic).

Amended claim 1 recites a selective wetting material comprising photosensitive (Si-H) and (Si-Si) fragments situated in a non-silicon containing and non-photosensitive organic polymer matrix formed in a two component plasma reaction. Generally (Si-H) fragments are predominant when a silicon donor such as monosilane is used, and (Si-Si) fragments are predominant when a silicon donor such as disilane is used since the composition of the silicon donor primarily controls fragment formation rather than the plasma reaction. One or more selective wetting regions are formed by oxidation of silicon in the (Si-H) and (Si-Si) fragments. Yoshimura teaches a composite selective wetting material, namely a substrate to which a film layer is deposited. Selected areas of this composite material form discrete hydrophobic regions (e.g. the deposited film layer) and discrete hydrophilic regions (e.g. exposed areas of the substrate). The selective wetting material of claim 1 of the application is formed from a single composition material that is selectively oxidized to form selective wetting regions in the single composition. Applicant submits that claim 1 is not anticipated by Yoshimura.

Claims 2-4 and claim 21 are dependent from claim 1; claim 5 is dependent from claim 4. Applicant submits that these claims, dependent directly or indirectly from claim 1 are not anticipated by Yoshimura.

Amended claim 22 recites a selective wetting material comprising photosensitive (Si-H) and (Si-Si) fragments situated in a non-silicon containing and non-photosensitive organic polymer matrix formed in a two component plasma reaction wherein monosilane or disilane is the silicon donor in the two component reaction. One or more selective wetting regions are formed by oxidation of silicon in the (Si-H) and (Si-Si) fragments. Yoshimura teaches a composite selective wetting material, namely a substrate to which a film layer is deposited. Selected areas of this composite material form discrete hydrophobic regions (e.g. the deposited film layer) and discrete hydrophilic regions (e.g. exposed areas of the substrate). The selective wetting material of claim 22 is formed from a single composition material that is selectively oxidized to form selective wetting regions in the single composition. Applicant submits that claim 22 is not anticipated by Yoshimura.

Claims 23, and claims 25-27 are dependent from claim 22; claim 24 is dependent from claim 23. Applicant submits that these claims, which are dependent directly or indirectly from claim 22 are not anticipated by Yoshimura.

Amended claim 28 recites a selective wetting material comprising photosensitive (Si-H) and (Si-Si) fragments situated in a non-silicon containing and non-photosensitive organic polymer matrix formed in a two component plasma reaction wherein monosilane is the silicon donor, and ethylene or toluene is an organic precursor in the two component reaction. One or more selective wetting regions are formed by oxidation of silicon in the (Si-H) and (Si-Si) fragments. Yoshimura teaches a composite selective wetting material, namely a substrate to which a film layer is deposited. Selected areas of this composite material form discrete hydrophobic regions (e.g. the deposited film layer) and discrete hydrophilic regions (e.g. exposed areas of the substrate). The selective wetting material of claim 28 is formed from a single composition material that is selective oxidized to form selective wetting regions in the single composition. Applicant submits that claim 28 is not anticipated by Yoshimura.

Claims 29 and 30 are dependent upon claim 28. Applicant submits that these claims, depending directly or indirectly upon claim 22 are not anticipated by Yoshimura.

Rejection of claims 1-5 and 21-30 as being obvious over Endo in view of Weidman and Ogawa

The Examiner states that "Endo discloses an amorphous coating layer of silicon carbide on an electronic substrate. The substrate is subjected to a plasma atmosphere of an organosilane or polyorganosilane compounds represented by the general formula $R_{2n+2}Si_n$, where R may be a hydrogen atom and $n=1-4$ (monosilane or disilane when $n=1$ or 2). The vapor or gas of the organosilane is mixed with a vapor or gas of a hydrocarbon compound, such as methane, ethane, ethylene or toluene (col.8, 18-44)."

Applicant points out that the above citation from Endo refers to the silicon molecule of an organosilicon compound taught by Endo. Endo, col. 2, line 59-col. 3, line 7 reads as follows:

"Typically, the organosilicon compound is exemplified by the silane or polysilane compounds represented by the general formula $R_{2n+2}Si_n$, in which R is a hydrogen atom or a monovalent hydrocarbon group selected from the class consisting of methyl, ethyl, propyl, phenyl and vinyl groups, not all of the R in a molecule being hydrogen atoms, and n is a positive integer not exceeding 4, ... "

Endo teaches an organosilicon compound that may contain a silane or polysilane molecule, and not monosilane or disilane as a plasma reactant. By definition an organosilicon compound contains carbon. The resulting plasma deposited film is an amorphous silicon carbide expressed by the formula Si_xC_{1-x} where x is 0.2 to 0.9, or a composite of silicon carbide with carbon and silicon. Endo teaches that "it is sometimes advantageous according to the value of the suffix x in the formula that the vapor or gas of a hydrocarbon compounds such as methane, ethane, propane, ethylene, acetylene, benzene, toluene and the like in order to ensure deposition of the silicon carbide having a desired value of the suffix in the formula" (col. 3, 54-60).

Endo's process produces a silicon carbide product. Applicant submits that the claimed photosensitive film comprising photosensitive (Si-H) and (Si-Si) fragments situated in a non-silicon containing and non-photosensitive organic polymer matrix is not

obvious in light of a silicon carbide product. Silicon carbide, in general, thermally dissociates at temperatures in thousands of degrees centigrade, whereas silane, in general, thermally dissociates at a much lower range, typically in the hundreds of degrees centigrade. Comparative energy differences for photodissociation of a silicon carbide product and the claimed photosensitive film formed from a silane reactant makes Endo's silicon carbide product significantly different from the claimed photosensitive film. In the present invention the use of a separate non-carbon containing and non-oxygenated silicon donor (that is, not an organosilicon compound), and a separate non-silicon containing and non-oxygenated organic precursor, are used to produce a photosensitive film product having photosensitive (Si-H) and (Si-Si) fragments situated in a non-silicon containing and non-photosensitive organic polymer matrix as further described above.

The Examiner states that "Weidman teaches that the irradiation of a silicon containing amorphous film with UV light in the presence of oxygen results in photo oxidation, which results in the formation of materials with reduced solubility and lower refractive index, properties useful for materials used in the fabrication of optical and electronic devices (abstract)." The silicon containing amorphous film referred to by Weidman are polysilynes. See Weidman col. 2, 12-23. These polysilynes are significantly different in structure than the silicon carbon films taught by Endo. One skilled in the art would not consider photo oxidation of Endo's silicon carbon bonded film since it is generally known that the bonding arrangement of silicon with carbon in silicon carbides does not support oxidation of the silicon bonded atoms as further discussed above. Further Weidman discloses reduced solubility of the polysilynes, but does not mention hydrophilic properties. Weidman discusses solubility of the polysilynes relative to their fabrication of devices wherein selective dissolution of deposited polysilynes. Solubility is not the same as the hydrophilic property of a material. Applicant appreciates that the present claims may be considered product by process claims, and not process of making claims, but Applicant believes Weidman is cited in an obviousness rejection as prior art that teaches photo oxidation of the Weidman polysilynes results in certain properties.

The Examiner states that "Ogawa teaches that a polymer containing Si containing material can be made hydrophilic by oxidation (col. 6, 31-35). The cited passage from Ogawa reads as follows: "The polymer composition is obtained according to the

invention by a method which comprises a step of making polymer-containing material surface hydrophilic by oxidation, ...". The "polymer-containing material surface" simply refers to a polymer material. See, for example, Ogawa's EXAMPLE 3 wherein a polycarbonate substrate is oxidized by subjecting it to an oxygenated plasma treatment in a UV dry striper to oxidize the polycarbonate substrate (col. 10-45). Contrast this with Ogawa's teaching that chlorosilyl groups can be reacted with water to form surface hydrophilic silanol bonds. That is Ogawa teaches making Si containing material hydrophilic without oxidation, and general "polymer-containing material surface" hydrophilic by oxidation. Further Ogawa teaches material surface modification and not photo oxidation of selective region of photosensitive film.

Applicant submits that one skilled in the art could only conclude from Ogawa that certain types of Si containing material (chlorosilyl) can be made hydrophilic by reaction with water, and from Weidman that polysilynes can be formed with reduced solubility (but not a change in hydrophilic property) by photo oxidation. Further Applicant submits that one skilled in the art would not take the teachings of Weidman and Ogawa to produce a selectively photo oxidized film from Endo's silicon carbon film. In light of the above Applicant submits that claim 1 is not obvious over Endo in view of Weidman and Ogawa. Claims 2-4 and claim 21 are dependent from claim 1; claim 5 is dependent from claim 4. Applicant submits that these claims, which are dependent directly or indirectly from claim 1 are not obvious over Endo in view of Weidman and Ogawa. In light of the above Applicant submits that claim 22 is not obvious over Endo in view of Weidman and Ogawa. Claims 23, 26 and 27 are dependent from claim 22. Applicant submits that these claims, which are dependent from claim 22 are not obvious over Endo in view of Weidman and Ogawa. In light of the above Applicant submits that claim 28 is not obvious over Endo in view of Weidman and Ogawa. Claim 30 is dependent from claim 28; Applicant submits that claim 30 is not obvious over Endo in view of Weidman and Ogawa.

With respect to claims 24, 25 and 29, the Examiner states that "Endo in view of Weidman and Ogawa is silent on the amounts of the silicon and carbon donors and does not disclose that the ratio of the silicon atoms to carbon atoms is approximately 1:7 or that the weight ratio of the organic precursor to the silicon donor is approximately

between 1:2 and 1:1. Endo does teach that the addition of the hydrocarbon compound is used to ensure that the deposition of the film has the desired Si and C (x) values (col.3, 46-60), thereby establishing that these ratios are result effective variables. It would be within the ordinary skill of one in the art to determine the optimal ratios for the silicon donor and organic precursors by routine experimentation and to have the ratio of the silicon atoms to carbon atoms be approximately 1:7 or to have the weight ratio of the organic precursor to the silicon donor be approximately between 1:2 and 1:1, if required, because Endo teaches that these ratios are result effective variables and the discovery of an optimum value of a result effective variable is ordinary within the skill of the art, as taught by In re Boesch (617 F.2d 272, 205 USPQ 215 (CCPA 1980)).” Endo seeks to maximize the amount of silicon carbon in the produced film as discussed above. In the present application the ratio of the silicon atoms to carbon atoms is approximately 1:7 or that the weight ratio of the organic precursor to the silicon donor is approximately between 1:2 and 1:1 as recited in claims 24, 25 and 29 are preferred ratios to achieve a selective wetting material that is sufficiently photosensitive. In light of the above, Applicant submits that claims 24 (dependent from claim 23), 25 (dependent from claim 22), and claim 29 (dependent from claim 28) are not obvious over Endo in view of Weidman and Ogawa.

Applicants respectfully requests reconsideration and allowance of all pending claims.

Respectfully submitted,



10 FEBRUARY 2004

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